suppose that the reaction only takes place when the special salt mentioned in the book is used, and if any other salt of the metal is offered to them to say, "but the book says such and such a salt is to be used." On the other hand, when the equations are expressed in the ionic form, as above, the student is perhaps inclined to forget that the anion of the metal and the cation of the reagent also interact.

There are those who look upon the "ionisation theory" as absolutely false and will have none of it. Others, mistaking theory for fact, ridicule all other theories and dogmatically state that *all* difficulties are surmounted when approached by means of the ionic theory. There are many, however, who, without subscribing to the opinions of the extremists, recognise in the ionic theory an extremely useful working hypothesis. Chemical analysis, which is apt to be dry and dull when viewed in —dare we say—the old-fashioned manner, becomes not only interesting, but many of the reactions which were obscure become clear in the light of the ionic theory. Thus, is the action of caustic alkalis upon ferric ferrocyanide (Prussian blue) always clear to students of the old regime? They are told that caustic alkalis decompose the compound according to the following equation :—

$$Fe_7(CN)_{18} + 12KOH = 4Fe(OH)_3 + 3K_4Fe(CN)_6 ;$$

but this does not explain why the whole of the iron is not precipitated as ferric hydrate. Now according to the ionic theory, this would be explained by saying that Prussian blue is dissociated into the cations $4Fe^{\cdots}$ and the complex anions $3Fe(CN)_6''''$ and that only the iron present as the cation is acted upon by the OH' of the potassium hydrate.

The arrangement of the book before us is in some respects peculiar. The student is first instructed how to construct a wash-bottle. This is followed on p. 3 by the preparation of hydrogen. The preparation of oxygen comes after that of hydrochloric acid and sulphuretted hydrogen, and is followed in succession by the methods of preparation of chlorine, sulphur dioxide, carbon dioxide and ammonia.

The analytical portion covers the usual ground and contains the usual reactions. Some portions of the chapter on "theoretical foundations" are far from clear, and we very much question whether the average reader will readily understand the two and a half pages on hydrolysis.

In a pocket at the end of the book there is a rather ingenious blank draught-board with the cations arranged along the top and the anions down the side. The compounds formed by the various ions are to be indicated in their proper squares, and if they are precipitates they may be indicated by shading or by filling in with coloured chalks.

The book has a table of contents, but no index. Even if the German edition was not indexed, surely the translator might have supplied one.

By the way, would it not be well if English writers of chemistry books would arrange always to write the positively charged ion in the same way? As it is, we find it sometimes spelt cation and sometimes kation.

F. M. P.

THE MOVEMENTS OF THE FOOT AND WRIST.

Der Gang des Menschen. iv. Thiel. *Ueber die Bewegung des Fusses und die auf denselben einwirkenden Kräfte.* Von Otto Fischer. Pp. 86; 3 plates. (Leipzig: Teubner, 1901.) Price Mk. 5·50.

Ueber die Bewegungen in den Handgelenken. Von Rudolf Fick. Pp. 54; with 8 figures in text and 10 plates. (Leipzig: Teubner, 1901.) Price Mk. 6·50.

IT is strange that two men, working side by side within the same university, publishing results of investigations on similar subjects in consecutive pages of the *Proceedings* of the same learned society, should produce two treatises so diverse in nature as those of Dr. Otto Fischer and Prof. Fick. Each employs a peculiar and comparatively new method for the solution of problems which have been thumbmarked by ten generations of anatomists. Dr. Fischer is a mathematician as well as an anatomist, a combination so rare that, in applying the later methods of mathematical physics to the elucidation of the movements of the human body in walking, he has left his colleagues far behind and is almost without audience or critic. Prof. Fick's paper is the result of the application of Röntgen rays to the study of the complex movements of the wrist-joint, a method only comparatively new.

If these authors differ in the methods they have employed they are alike in this, that they are minute, painstaking and accurate, investigating fully every fact for its own sake, with no thought whatsoever as to its utility. Prof. Fick has determined in millimetres the extent and direction of the movements undergone by each of the nine carpal bones during flexion, extension, abduction and adduction of the wrist. In the last paragraph of his paper he sums up his main result as follows :—

> "In conclusion I would once more emphasise, what this research has again demonstrated, that the mid-carpal joint is indeed no paltry minor articulation (Kein unwichtiges Nebengelenk) deserving the stepmotherly consideration (stiefmütterliche Berucksichtung) extended to it by most practitioners, but that, for many movements of the hand, it is emphatically the chief joint."

In this conclusion the author, as he himself explicitly states, only verifies the observation made many years ago by Henke. The elaborate and expensive plates, the type and style in which Prof. Fick's work has been published, make an English anatomist envy the wealth of a German society that is able to devote so much of its funds to the elucidation of so small a part of the human body.

In his last contribution to the Kinematics of the human gait, Dr. Fischer dealt with the movements of the lower extremity during the cycle of a double stride; in this, his fourth contribution, he considers the movements of the foot during a corresponding period. The foot is dealt with as if it were detached from and independent of the rest of the body. The forces which act on it during the cycle of a double stride are traced to four sources, viz the muscles (extensor and flexors of the foot), weight of the body, weight of the foot and reaction of the ground. The points at which these forces are applied and the centre of gravity of the foot are determined and diagrammatically represented. The velocity and acceleration of the

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centre of gravity of the foot, in the forward, lateral and vertical directions, during the period of a double stride, are determined and diagrammatically represented in three very carefully prepared plates. A. K.

OUR BOOK SHELF.

Ueber angewandte Mathematik und Physik in ihrer Bedeutung für den Unterricht an den höheren Schulen. Nebst Erlauterung der bezüglichen Göttinger Universitätseinrichtungen. Vorträge . . . gesammelt von F. Klein und E. Riecke. Pp. viii + 252. (Leipzig: Teubner, 1900.)

THIS miscellaneous collection falls into two parts. The first consists of eight lectures delivered to teachers in higher schools during a vacation course at Göttingen; of these the first is a sketch of the history of the Physical Institute at Göttingen and the instruction given there; the others deal with various technical branches of applied science in which mathematics plays an important part. The second and probably, to the English reader, the more interesting part of the volume is a reprint of various essays and addresses by Prof. F. Klein, in which he discusses the relation of universities to technical high schools (technische Hochschule). Prof. Klein is clearly of opinion that in Germany these two classes of institutions have become unduly isolated from each other, and should aim at greater solidarity, working loyally for their common welfare.

As one who is interested in the work of both, as well as in the good of the State, he deprecates the tendency in the universities, on the one hand, to divorce the study of mathematics from its practical applications, and in the technical schools, on the other, to take too narrow a view of mathematical science and regard it *merely* as subsidiary and subordinate to the requirements of practical engineering and the like. These tendencies are not wholly unknown in England, and Prof. Klein's arguments and suggestions deserve the attention of our mathematicians and teachers of applied science both in the universities and elsewhere. M.

The Ethical Philosophy of Sidgwick. By F. H. Hayward. Pp. xxiv + 275. (London: Swan Sonnenschein and Co., Ltd., 1901.) Price 4*s*. 6*d*.

A MOST useful though modest and unpretentious little work. In the nine essays of which it is composed the author summarises the main features of the doctrine of the "Methods of Ethics," and discusses from the point of view of an admiring but candid and discriminating reader the principal difficulties of Sidgwick's position. On the vexed question whether Sidgwick is in his ethics fundamentally an egoist or not, Mr. Hayward decides, after a careful examination, in the affirmative, with good reason as the writer of this notice thinks. A good feature of the book is the very full and impartial statement of the controversial arguments against Sidgwick urged by evolutionists on the one side, and neo-Kantians on the other. The care with which the changes in the successive editions of the "Methods" have been noted and allowed for and the thoughtful provision in the opening pages of a summary of Sidgwick's often prolix argument add to the value of a book which all students of ethics will find useful and suggestive. If the book should reach a second edition perhaps the author will tell us more definitely how far he regards the presence of apparently conflicting points of view in the "Methods" as due to excessive care in formulating a delicately balanced and consistent theory, and how far to the attempt to unite together elements which are really irreconcilable. At present he seems to hesitate in his verdict. As a scholar it is to be trusted he will purge future editions of such misspellings as "Königsb*u*rg" and ἐνεργεῖα, and such ugly formations as "perfectionistic" and "introspectionist." A. E. T.

On Traces of an Indefinite Article in Assyrian. By R. Campbell Thompson, M.A. Pp. 31. (London: David Nutt, 1902.) Price 2*s*. 6*d*.

IN this interesting pamphlet the author has attempted to throw some light upon an obscure point of Assyrian grammar, which for some years past has engaged the attention of Semitic scholars, although no completely satisfactory explanation has hitherto been given of it. The point to be explained, and to which attention was first called by Dr. Flemming, is the occasional occurrence of Assyrian and Babylonian words in which the case-endings have been dropped, although the words in question are not in the construct state. The explanation which is now generally accepted, and which was first put forward by Prof. Jensen, assumes that the dropping of the case-endings was a result of the degeneration of the language, a process which finds a parallel in modern Arabic. Mr. Thompson, however, suggests that we may see in the omission of the case-endings traces of an absolute state in Assyrian, similar to that in use in Aramaic; and, assuming this to be the case, it follows that the noun with the case-endings possesses the force of the emphatic state in Aramaic, although it appears to have no equivalent for the post-positive article. Mr. Thompson has arranged his examples to illustrate the rules which hold good for the absolute in Syriac; but he does not run his theory to death, and is fully conscious that the occurrence of variants with the case-endings shows that "the noun need not of necessity adhere to any fixed law."

We cannot here go into detailed criticism of the examples cited, but will only refer to one fact which appears to us to favour the received explanation rather than that here put forward. According to Mr. Thompson, the omission of the case-endings is due to *survival*, and not to degeneration. We should expect, therefore, to find the examples of its occurrence commoner in the early texts than in those of the later periods; as a matter of fact, the reverse appears to be the case. In the Old-Babylonian inscriptions, the case-endings (apart from the use of the construct) are rarely omitted, while the most striking examples of their omission occur in Assyrian and Neo-Babylonian texts. We must congratulate Mr. Thompson on the clearness and brevity with which he has stated his case, and Assyriologists will find the collection of extracts he gives most useful for a study of the question.

Sir Thomas Browne's Notes and Letters on the Natural History of Norfolk. Edited by T. Southwell. Pp. xxvi + 102. (London: Jarrold and Sons, 1902.)

NORFOLK sportsmen and naturalists—and they are many—will be sure to find much to interest them in a work dealing with the fauna of their county as it was in the middle of the seventeenth century, when, as the author tells us, cranes were often seen in hard winters, while bustards were comparatively abundant, although never, perhaps, so common as is often supposed. Sir Thomas Browne, it appears, was a Norwich physician who in early life travelled much. Although not to be compared in point of interest with those of Gilbert White, his letters and notes indicate a keen and shrewd observer of natural history. A large part of the value of the work is, however, due to the editor, who is well known for the keen interest he takes in all that concerns the natural history of the county. Not only has he deciphered with rare skill and patience a vast amount of crabbed MS., but he has contributed a series of foot-notes containing much valuable and interesting information. R. L.

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